

# A new subspecies of *Caustis blakei* Kük. in Queensland

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## Summary

Johnston, Margaret E., Swarbrick, John T., Wearing, Alan H. and Webber, Julie H. (1997). A new subspecies of *Caustis blakei* Kük. in Queensland. *Austrobaileya* 4(4): 613–617. *Caustis blakei* Kük. is divided into two subspecies that are geographically isolated. *C. blakei* subsp. *macrantha* subsp. nov., occurs inland near Murphy's Creek and Helidon, south-east Queensland. It has larger anthers, spikelets and fruit than *C. blakei* subspecies *blakei*, which occurs in coastal districts and on islands in south-east Queensland. Notes on distribution and conservation status are provided.

Keywords: *Caustis blakei*, *Caustis blakei* subsp. *macrantha*, *Caustis blakei* subsp. *blakei*.

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## Introduction

The original description of *C. blakei* was a verbatim manuscript description written by Kükenthal and published by Blake (1943). Kükenthal (1944) subsequently published a more detailed description and corrected some of the errors made earlier. However, all specimens examined by Kükenthal (1944) were collected from coastal areas of south-east Queensland. Brief descriptions of *C. blakei* and keys to the Queensland and New South Wales species of *Caustis* have since been presented by Sharpe (1986), Beadle (1987), Stanley and Ross (1989) and Wilson (1993).

## Materials and methods

Vegetative morphology of *C. blakei* was studied in five mature plants that were collected at random at each of 12 sites in south-east Queensland in October 1991. Ten sites were located on the Sunshine Coast and there were two inland sites: Murphy's Creek and Helidon. Spikelets were collected from plants at each of these sites in early February 1992. Stem pieces with spikelets were collected from four randomly selected plants at each site and from two individual stems on each plant, one with young and one with old spikelets. Stem pieces were stored in 95% ethanol mixed with 5% glycerol

until examined. Three spikelets from each stem were dissected and measured. Data was collected on the length of the spikelet and the number of glumes it possessed together with the lengths of its style, stigma, anther, ovary and gynophore.

Spikelet morphology was further studied in January 1994 using the material collected in February 1992. Six spikelets with protruding anthers were selected from each of four stems from each of the 12 sites. Lengths of spikelets and anthers (with apical appendage) were measured.

A total of twenty mature fruit was collected from plants at five sites in October 1992. The total weight of 10 fruits was recorded and the lengths of 20 fruit were measured with and without the beak (base of the style).

Analyses of variance were computed for each character at each site using the general linear model analysis of variance. The association between floral characters and sites was investigated using the Bray and Curtis option in the statistical package PATN (Belbin 1990a & 1990b).

## Results

### Distribution of *Caustis blakei*

Figure 1 shows the distribution of *C. blakei*, based on the localities listed on specimens from

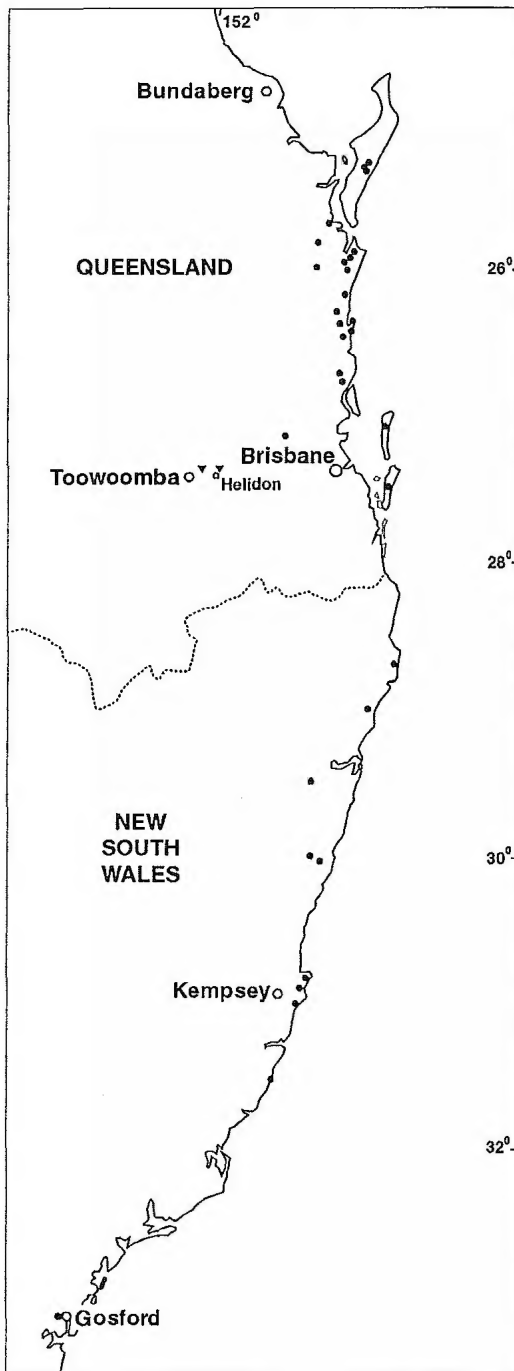


Fig. 1. Distribution of *Caustis blakei* subsp. *blakei* • ; *C. blakei* subsp. *macrantha* ▽ .

all State herbaria. *Caustis blakei* occurs on mainland Australia from Toolara near Maryborough in Queensland to Crowdy Bay or possibly Gosford in New South Wales. It also occurs on Fraser, Moreton and Stradbroke Islands, Queensland. There are inland populations of this species at Murphy's Creek and Helidon in Queensland. These are geographically isolated from coastal populations of *C. blakei*. Another population of it, at Diana's Bath near Esk in Queensland, is geographically between the inland and coastal populations. However, a recent inspection of the Diana's Bath population has shown it to be similar morphologically to the coastal form with its small spikelets and anthers.

### Floral morphology

A study of floral morphology in specimens of *C. blakei* collected from 12 sites in south-east Queensland showed the spikelets collected from the inland populations at Murphy's Creek and Helidon, east of Toowoomba, had significantly larger ( $P < 0.01$ ) spikelets and anthers than those collected from coastal sites (Table 1, Figure 2). The mature fruit collected from the Murphy's Creek site were significantly larger ( $P < 0.01$ ) and heavier than those collected from coastal sites at Fraser Island heath or State Forest 451, Tuan and Coop's Bridge (Table 1, Figure 2). No fruit were collected at the Helidon site.

The association between floral characters and sites was investigated using the Bray and Curtis option in the statistical package PATN (Belbin 1990a & 1990b). The dendrogram obtained (Figure 3) suggested that spikelets collected from Murphy's Creek and Helidon were morphologically similar to each other but different from spikelets collected from any coastal site.

The differences in the lengths of spikelets, anthers and fruit of *C. blakei* collected from coastal and inland populations cannot be clearly observed by examination of herbarium specimens, as anthers and spikelets on dry specimens deteriorate over time. Some immature fruit can be seen on herbarium specimens of *C. blakei* but fruit fall from plants when mature, so are not widely represented in any herbarium specimen we have seen.

**Taxonomy**

**Caustis blakei** Kük. in Blake, *Proc. R. Soc. Qd* 54(8):71 (1943). **Type:** Queensland. MORETON DISTRICT: On Moreton Island near The Big Sandhill, on hillside on sand, in mixed open forest, 11 September 1938, Blake 13845 (iso:BRI).

Stems rigid, erect, smooth, with 10–28 nodes, up to 2 m tall, 2.5–5.0 mm in diameter. Leaves of mature plants reduced to dark brown sheathing scales with pointed apices. Vegetative nodes 10–18 per stem, each with 1–6 lateral branches,

the ultimate branchlets (sterile pedicels) straight or slightly flexuose, rarely more than 0.4 mm wide, either dense and hiding the rachis or sparse and open. Young flowering branches contracted, flexuose, narrow; branches and branchlets eventually expanding; spikelets 1 to about 1000 per inflorescence, 6–11 mm long, usually 1-flowered, bisexual; glumes 3–6, dark brown, long acuminate; stamens 3; anthers 3–6.5 mm long; style 3-fid. Mature nut black to dark brown, including beak 6–9 mm long, without beak c. 4–6 mm long.

The species is represented by two subspecies.

**Key to the subspecies of *Caustis blakei***

1. Spikelets 6–8 mm long, anthers including appendage 2.5–4.5 mm long;  
fruit including base of the style 6–7.5 mm long . . . . . *C. blakei* Kük. subsp. *blakei*
- Spikelets 8.5–11 mm long, anthers including appendage 4.5–6.5 mm long;  
fruit including base of style) 7–9 mm long . . . . . *C. blakei* subsp. *macrantha*

***Caustis blakei* Kük. subsp. *blakei***

**Selected specimens examined:** Queensland. WIDE BAY DISTRICT: Cooloola National Park, 16 km north of Noosa Heads and 3 km north of track leading to Teewah Landing Stage to beach, October 1978, *Sharpe* 2430, (BRI). WIDE BAY DISTRICT: Knifeblade sandblow, c. 1.5 km south-east of Deep Water Lake Fraser Island, July 1986 *Briggs* 7995, (BRI).

**Habitat:** *C. blakei* subsp. *blakei* occurs in tall to very tall *Eucalyptus* forests with sparse to closed canopies, on sandy soils or soils derived from weathered sandstone. The canopy species usually included *Eucalyptus pilularis* Sm. (= *E. racemosa* Cav.), *Corymbia intermedia* (R.Baker)K.D.Hill & L.A.S. Johnson and/or *E. signata* F.Muell.

***Caustis blakei* subsp. *macrantha*** M.E. Johnston & J.H. Webber, subspecies nova a *Caustis blakei* Kük. subsp. *blakei* spiculis 8.5–11 (non 6–8) mm longis, antheris 4.5–6.5 (non 2.5–4.5) mm longis, et fructibus 7–9 (non 6–7.5) mm longis differt. **Typus:** Queensland. MORETON DISTRICT: College Timber Reserve, Murphy's Creek, (27°26'S, 152°06'E) 08 January 1996, *M.E. Johnston & J.H. Webber* [AQ597234] (holo:BRI; iso:NSW).

**Habitat:** *C. blakei* subsp. *macrantha* occurs in tall *Eucalyptus* forests with sparse canopy on soils derived from weathered sandstone. The canopy species are *Eucalyptus acmenoides* Schauer, *E. baileyana* F.Muell. and *Corymbia trachyphloia* (F.Muell.)K.D.Hill & L.A.S. Johnson or *E. pilularis* and *E. planchoniana* F.Muell..

**Conservation status:** Substantial quantities of *C. blakei* are bush-harvested from both coastal and inland populations and exported as cut foliage. *Caustis blakei* is fire-sensitive and regenerates from soil-stored seed. Whereas *C. blakei* subsp. *blakei* is common in coastal areas, with large populations in World Heritage areas and national parks, there are no national parks in the Murphy's Creek or Helidon areas where *C. blakei* subsp. *macrantha* occurs. Furthermore, inland areas have much lower rainfall and this lowers growth rates and increases fire risk. The inland subspecies is under pressure from urban and quarry developments, frequent bushfires and harvesting and warrants a conservation coding of 2Vi according to the criteria of Briggs & Leigh (1988).

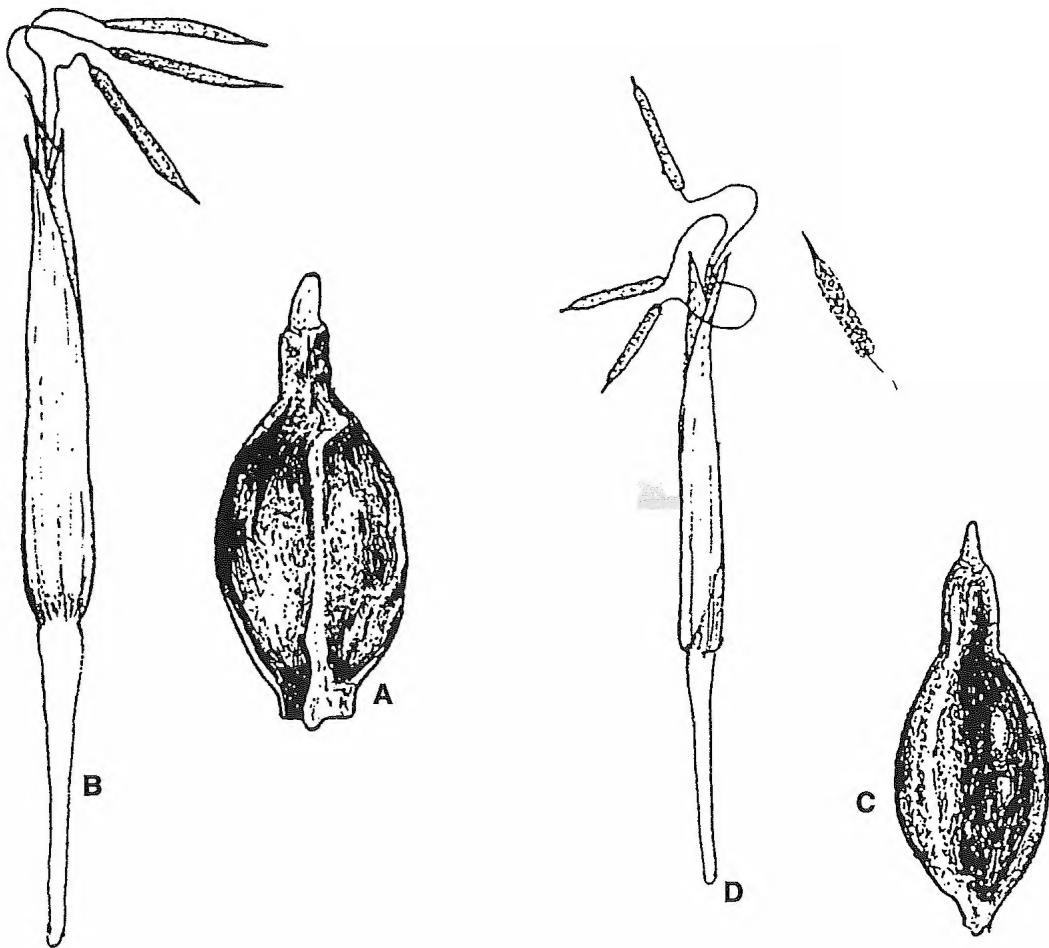


Fig. 2. A-D. *Caustis blakei*. A comparison of spikelets, anthers and fruit from Murphy's Creek and Fraser Island heath (7.5 times actual size); A-B. *C. blakei* subsp. *macrantha*; C-D. *C. blakei* subsp. *blakei*.

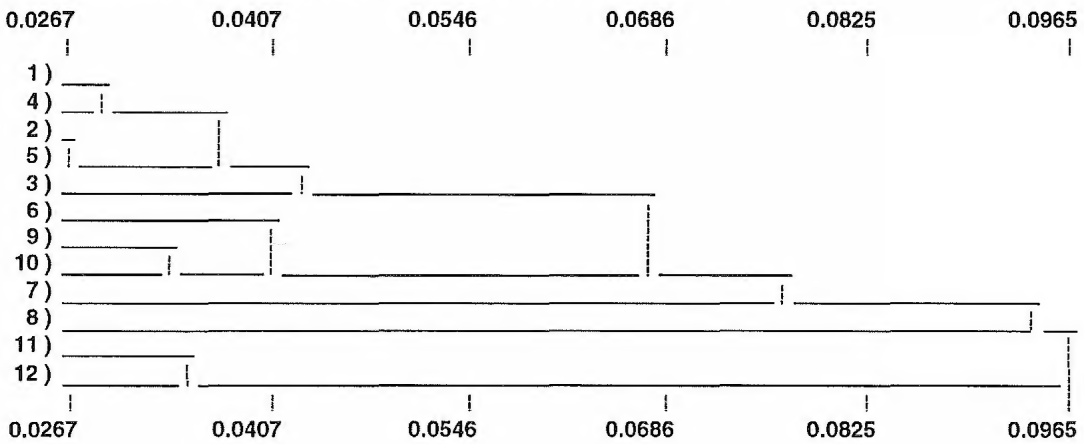


Fig. 3. *Caustis blakei*. The association between floral characters and sites of collection. Spikelets collected from the inland sites of Murphy's Creek and Helidon (listed as sites 11 and 12 on the y-axis) were similar to each other but dissimilar to spikelets collected from any coastal sites (listed as sites 1 to 10 on the y-axis).



**Table 1. *Caustis blakei* Mean length of mature spikelets and anthers (with apical appendage) of plants collected from all sites and mean length of mature fruit (with and without a beak).**

Site	Mean length of spikelets (mm)	Mean length of anthers (with apical appendage (mm))	Mean length of fruit (mm)	Mean length of fruit without beak (mm)	Weight of ten fruit (g)
Fraser Is. heath	7.38	3.97	6.68	4.60	0.149
Fraser Is. forest 5	7.30	3.59	-	-	-
Fraser Is. forest 4	7.49	3.48	-	-	-
State Forest 451	7.80	3.69	7.50	5.10	0.152
Tuan	7.61	4.13	6.88	4.75	0.146
Dinna Creek	7.42	3.77	-	-	-
Toolara	7.41	3.60	-	-	-
Coop's Bridge	7.91	3.72	7.03	5.25	0.152
Noosa Parklands	7.29	3.29	-	-	-
Landsborough Rd	7.49	4.12	-	-	-
Murphy's Creek	9.39	5.81	7.95	5.35	0.235
Helidon	9.66	5.92	-	-	-
LSD 0.05	0.32	0.30	0.30	0.44	-
LSD 0.01	0.42	0.40	0.40	0.59	-

### Acknowledgements

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